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PATENT

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SPECIFICATION

INVENTION: FILTERING DEVICE

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FILTERING DEVICE

[0001] The invention relates to a filtering device according to the preamble of Claim 1.

[0002] Filtering devices of this type are known per se; for example, from the field of separators where it is known to place axially mutually offset diaphragm plates on the inlet pipe.

[0003] This arrangement has been successful per se. Nevertheless, there is demand for a filtering device with filtering disks, particularly diaphragm disks, which permits a good filtering effect, while the construction is particularly simple, and preferably has a low energy consumption.

[0004] The implementation of such a filtering device is an object of the invention.

[0005] The invention achieves this task by means of the object of Claim 1.

[0006] Accordingly, more than two of the spindles provided with the filtering plates (particularly diaphragm plates) is distributed in the container, and the spindles can be rotated relative to the container.

[0007] The arrangement is characterized by a simple construction with a stationary non-rotatable container and a low energy requirement while the filtering effect is good.

[0008] The diameter of the diaphragm plate preferably is so large that the diaphragm plates of adjacent spindles overlap in their outer-circumference area, the diaphragm plates of adjacent spindles correspondingly being arranged axially offset with respect to one another.

[0009] The overlapping area especially has the advantage of a particularly low risk of the formation of a covering layer of solids on the diaphragm disks and thereby increases a sanitary suitability or design.

[00010] The inflow preferably leads tangentially into the container which is cylindrical at least in sections, which results in a preliminary separation because of the centrifugal effect and in a simple possibility of the sole or additional drive of the plates with the spindles by the circulating liquid.

[00011] A plurality of spindles is preferably uniformly distributed on a circle of a radius "r" in the container.

[00012] According to another advantageous variant, the number of spindles is even so that a largely symmetrical arrangement is implemented in which the diaphragm plates of all spindles can overlap.

[00013] For implementing a sufficient processing capacity, it is expedient to arrange a plurality of diaphragm plates (for example, ten or more) on each spindle.

[00014] The container is preferably hydroclonically shaped. In a particularly advantageous manner, this achieves a preliminary separation of solid particles which results in a minimized action of solids upon the diaphragm plates. As a result of the turbulence of the spindles and the diaphragm plates toward the outside - away from the diaphragms - the solids retained by the diaphragm surfaces are then necessarily carried away downward by gravity.

[00015] Advantageous further developments are contained in the subclaims.

[00016] In the following, the invention will be described in detail with respect to the drawing by means of embodiments.

[00017] Figure 1 is a sectional view of an embodiment of a filtering device; and

[00018] Figure 2 is another sectional view of the filtering device of Figure 1, which is perpendicular to Figure 1.

[00019] Figure 1 illustrates a filtering device 1 with a stationary non-rotatable container 2 which is hydroclonically shaped. A cylindrical section 3 of the container 2 with a center axis M here oriented perpendicularly or vertically and with a tangentially oriented inlet 4 is adjoined in the downward direction by a tapering conical section 5 which leads into an outlet

6 in the downward direction.

[00020] Because of the tangential inlet 4, a motor drive can be eliminated if the product inflow speed is sufficient because the forming twist drives the diaphragm disks as a result of the developing friction. However, for supporting the rotating movement, a drive can optionally be utilized which has a motor with a belt transmission (not shown here).

[00021] The container 2 or its cylindrical section 3 is closed on its top side by means of a type of lid which simultaneously is used as a bearing housing 7 for several spindles 8 which in each case project from above into the container 2 and which are oriented parallel to one another.

[00022] Here, the spindles 8 project to the start of the conical section 5 into the container 2. They are, for example, each rotatably disposed by means of two bearings 9 in bores 10 of the bearing housing 6 in an overmounted manner. The overmounting of the here advantageously vertically oriented spindles 11 has the advantage of a particularly sanitary product space in the container 2 and the additional advantage of reduced component and sealing expenditures. If necessary, a sieve sheet 17 can be inserted at the end facing away from the bearing housing 7 for the support and friction damping of the spindles 8, which is penetrated by the spindles 8. This measure has a positive effect particularly when there is a passing through a critical rotational speed. The bearing 9 is protected from a product overflow by means of leakage drains 16.

[00023] Particularly advantageously, an even number of bores 10 with the spindles 8 - here, for example, a total of six spindles 8 - are uniformly distributed on a circle having a radius r, the center axis M of the container 2 extending through its center.

[00024] At least two or more (for example, more than ten) or preferably a large number of diaphragm plates 11 are arranged on each of the spindles 8 in its area projecting into the container 2, which diaphragm plates 11 here have a round construction and are oriented concentrically with respect to the spindles 8.

[00025] The diaphragm plates 11 preferably consist of a ceramic material. In addition, they preferably have a two-layer construction, in which case an annulus (not visible here) is constructed between the two upper and lower ceramic layers, which in each case leads to the interior toward the spindles 8 into in each case at least one duct 12 which, in turn, each lead into discharge ducts leading out perpendicularly toward the top in the spindles. These discharge ducts 13, in turn, lead out at their upper ends into a common (ring) discharge bore 14 in the bearing housing 6, which discharge bore 14 is provided with an outlet 15 for carrying away the liquid from the filtering device.

[00026] The diaphragm plates 11 have a width b in the axial direction. In this case, the axial spacing a of the diaphragm plates 11 meets the requirement a>b; that is, the diaphragm plates 11 are axially on the spindles 8 each spaced away from one another such that the edge of another diaphragm plate 11 can be slid in between them at the outer circumference.

[00027] This is utilized as follows. As illustrated in Figure 2, the diameter of the diaphragm plates 11 is in each case selected to be so large that the diaphragm plates 11 of adjacent spindles 8 overlap one another in their outer circumference area. For this purpose, the diaphragm plates 11 on adjacent spindles 8 have to be arranged correspondingly axially offset with respect to one another.

[00028] This arrangement has the following function:

[00029] A free-flowing substance to be filtered is guided through the tangential inlet 4 into the filtering device 1 or its container 2. The inflowing liquid takes along the diaphragm plates 11 and in this manner causes each of the spindles 8 to rotate.

[00030] As a result of the hydroclonical shaping, a preliminary separation is achieved which leads to a minimized action of solids upon the diaphragm.

[00031] At the diaphragm disks 11 - particularly in the overlapping area of the diaphragm disks or plates 11 -, additional solids are separated from the substance to be filtered.

[00032] The filtered liquid phase flows through the diaphragms of the diaphragm disks 11 into

their annulus and from there through the ducts 12 as well as through the discharge ducts 13 and the discharge bore 14 and the outlet 15 to the outside.

[00033] The solids retained by the diaphragm surfaces of the diaphragm plates 11 are thrown by the turbulence toward the outside away from the diaphragm and is then discharged downward through the outlet 6.

Reference Numbers

Filtration device	1
container	2
cylindrical section	3
tangential inlet	4
conical section	5
outlet	6
bearing housing	7
spindles	8
bearing	9
bores	10
diaphragm plates	11
duct	12
discharge ducts	13
discharge bore	14
outlet	15
leakage drains	16
sieve sheet	17
center axis	M
spacing (or distance)	a
width	b